erco & gener

L'esprit Modem

User Guide

GenPro 20e

GenPro 24e

Reference : EG_GenProxxe_988_UG_007_UK

Revision :   007

Date :   14/03/2011

Document history

Revision	Modifications	Author	Date
000	CREATION (Version UK)	F. LE BRETON M. REEVES	09/11/06
001	Modified schema 2-wire cable page 16. Added Hardware WatchDog function page 11-30-35.	F. LE BRETON	20/02/07
002	Checked functionnal architecture page 30. Added ROHS directive page 50.	F. LE BRETON	06/03/07
003	Removed Memory Flash 16 Mbits page 7. Added warning SIM during the Firmware update (OS) page 26. Modified Buzzer page 41.	F. LE BRETON	19/03/07
004	Modified idle mode page 39.	F. LE BRETON	18/07/07
005	Added Copyright chapter page 6. Modified 2-wires micro FIT cable picture page 16.	F. LE BRETON	11/02/08
006	Modified Warning page 13	F. LE BRETON	24/03/09
007	Suppress the GenPro 10e and the GenPro 14e	YST	14/03/11

The main modifications in this document compared to its previous version, are easily identifiable on a monitor by means of the blue text.

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CONTENTS

Presentation

Entirely dedicated to the wireless markets throughout the world, the GenPro allows a simple and rapid integration of GSM DATA / VOIX / SMS Quad-Band (850/900/1800/1900 MHz) connectivity into M2M applications.

The GenPro is a robust, reliable and long life product. Its very compact metal case makes it ideally adapted to onboard standards. This product also conforms to the automotive standards ("E" label).

The GenPro modem is Bi-Band 900/1800 MHz (please consult for the Quad-Band version 850/900/1800/1900 MHz) and GSM or GSM/GPRS Class 10. It is available in two versions: GenPro 20e and GenPro 24e (see Product Differences table).

Optional flash memory extension and integrated shock detector associated with development tools, offer the possibility for the personalisation of supplementary applications.

The GenPro modem provides the TCP/IP protocols as well as 3 inputs and 1 output allowing the immediate development of onboard high value-added telematic solutions.

The GenPro provides two modes of operation:

- External mode (standard mode): Control is by an external application. The modem is used with an AT command set (see the ERCO & GENER Commands List).
- Specific Development mode: The Open-AT development tool allows the development of supplementary and personalized applications. For example: once configured, the modem is completely autonomous – it records information from its inputs and automatically transmits it to a client's application via different services: SMS, GSM Data, FTP GPRS, TCP socket GPRS. For further information concerning the tools and training, please consult our sales department.

This document describes the modem and provides the following information:

- General presentation,
- Functional description,
- Available basic services,
- Installation and use (first level),
- User-level trouble shooting,
- Recommended accessories.

For further information, please refer to the following documents:

- Commands List
- Application Notes
- Release Notes
- Client support (Hot-Line)

Warning

- TO AVOID ALL RISK OF ELECTROCUTION, DO NOT OPEN THE UNIT

- THE UNIT CONTAINS NO USER REPAIRABLE COMPONENTS

- THE UNIT MUST BE RETURNED TO THE MANUFACTURER FOR ANY REPAIRATION

- THE UNIT MUST NOT BE CONNECTED DIRECTLY TO THE MAINS SUPPLY. PLEASE USE A SUITABLE EXTERNAL POWER SUPPLY.

In its continuing research into improving its products, ERCO & GENER reserves the right to modify its products and documentation at any time.

Copyright and Disclaimer

1 References

1.1 Product Differences

The various features of the GenPro product range are show in the Product differences table below:

GenPro 2xe Modem	20e	24e
GSM Features		
- E-GSM Bi-Band 900/1800 MHz – Quad-Band 850/900/1800/1900 MHz (*)	X	X
- ETSI GSM Phase 2+ Class 4 (2W @ 850 / 900 MHz) Class 1 (1W @ 1800 / 1900 MHz)	X	X
- SIM Toolkit Release 99	X	X
VOICE Features		
- Voice (GSM mode)	X	X
- Telephone, Emergency Number 112	X	X
- Full Rate, Enhanced Full Rate, Half Rate (FR/EFR/HF)	X	X
- Echo Cancellation and Noise Reduction	X	X
- Full Duplex Hands Free	X	X
DATA Features		
- GPRS Class 10 (up to 4Rx / 2Tx)	X	X
- Supports PBCCH, Coding schemes : CS1 à CS4	X	X
- TCP/IP Library (PPPRFC, TCP Socket, UDP Socket, SMTP, POP3, FTP) (*)	X	X
- Asynchronous data circuit, transparent and non-transparent, 9600 bps (standard) up to 14400 bps (depending on network)	X	X
- Compatible Fax Group 3	X	X
- SMS point to point MT/MO and SMS CB	X	X
Memory Type		
- Flash 32 Mbits and SRAM 4 Mbits (32/4)	X	X
Interfaces		
- Antenna GSM : SMA-F connector	X	X
- Power Supply : +5.5 à +32 VDC (micro-FIT connector)	X	X
- RS232 + Audio via female 15-pin Sub-D connector	X	X
- AT Commands: GSM 07.05 and 07.07	X	X
- 3 opto-coupled inputs : 3Vdc to 32Vdc (micro-FIT connector)		X
- 1 Open-collector output : 60Vdc - 1A (micro-FIT connector)		X
- SIM reader (SIM 3V – 1,8V)	X	X
- Watchdog	X	X
Supplied Accessories		
- Fixing brackets (x2)	X	X
- Power Supply cable - 2-wire Micro FIT	X	
- Power Supply and Input/Output able - 4-wire Micro FIT		X
- Inputs cable - 2-wire Micro FIT		X

(*) Please consult us

1.2 Reference Documents

Wavecom AT Commands Interface Guide:
P_AT_Commands_Interface_Guide_for_Xxxx_Appendix_revyyy

Software update procedure:
EG_GenProxxe_988_UP_000_UK

GSM reference documents:
- GSM 07.05.
- GSM 07.07.

1.3 Abreviations

AC	Alternative Current
ACM	Accumulated Call Meter
AT	Attention (prefix for modem commands)
BTS	Base Transceiver Station
CLK	ClocK
CMOS	Complementary Metal Oxide Semiconductor
CS	Coding Scheme
CTS	Clear To Send
dB	Decibel
dBc	Decibel relative to the Carrier power
dBi	Decibel relative to an Isotropic radiator
dBm	Decibel relative to one milliwatt
DC	Direct Current
DCD	Data Carrier Detect
DCE	Data Communication Equipment
DCS	Digital Cellular System
DSR	Data Set Ready
DTE	Data Terminal Equipment
DTMF	Dual Tone Multi-Frequency
DTR	Data Terminal Ready
EEPROM	Electrically Erasable Programmable Read-Only Memory
EFR	Enhanced Full Rate
E-GSM	Extended GSM
EMC	ElectroMagnetic Compatibility
EMI	ElectroMagnetic Interference
ESD	ElectroStatic Discharges
ETSI	European Telecommunications Standards Institute
FIT	Series of connectors (micro-FIT)
FR	Full Rate
FTA	Full Type Approval
GCF	Global Certification Forum
GND	GrouND
GPIO	General Purpose Input Output
GPRS	General Packet Radio Service
GSM	Global System for Mobile communications
HR	Half Rate
I	Input
IEC	International Electrotechnical Commission
IMEI	International Mobile Equipment Identification
I/O	Input / Output

LED	Light Emitting Diode
MAX	MAXimum
ME	Mobile Equipment
MIC	MICrophone
Micro FIT	Family of connectors from Molex
MIN	MINimum
MNP	Microcom Networking Protocol
MO	Mobile Originated
MS	Mobile Station
MT	Mobile Terminated
NOM	NOMinal
O	Output
Pa	Pascal (for speaker sound pressure measurements)
PBCCH	Packet Broadcast Control Channel
PC	Personal Computer
PCL	Power Control Level
PDP	Packet Data Protocol
PIN	Personal Identity Number
PLMN	Public Land Mobile Network
PUK	Personal Unblocking Key
RF	Radio Frequency
RFI	Radio Frequency Interference
RI	Ring Indicator
RMS	Root Mean Square
RTS	Request To Send
RX	Receive
SIM	Subscriber Identification Module
SMA	SubMiniature version A RF connector
SMS	Short Message Service
SNR	Signal-to-Noise Ratio
SPI	Serial Peripheral Interface
SPL	Sound Pressure Level
SPK	SpeaKer
SRAM	Static RAM
TCP/IP	Transmission Control Protocol / Internet Protocol
TDMA	Time Division Multiple Access
TU	Typical Urban fading profile
TUHigh	Typical Urban, High speed fading profile
TX	Transmit
TYP	TYPical
UTC	Universal Time Clock
VSWR	Voltage Stationary Wave Ratio

2 Packing

2.1 Contents

The GenPro is supplied with:

- GenPro packing case,
- GenPro modem,
- 2 fixing brackets,
- Instructions Sheet.
- 4-wire cable (Red/Black/Orange/Green) with in-line fuse (depending on GenPro),
- 2-wire cable (Red/Black) with in-line fuse (depending on GenPro),
- 2-wire cable (Blue/Yellow) (depending on GenPro).

ATTENTION : Depending on the GenPro ordered, either 2 or 4-wire cables are supplied.

2.2 Packing Case

Packing case external dimensions:

- Width: 54.5 mm,
- Height: 68 mm,
- Length: 108 mm.

An identification label is attached to the top of the packing case. It contains

- The ERCO & GENER logo,
- The product reference (GenPro xxe),
- CE mark,
- Hardware WatchDog mark,
- The IMEI 15-digit bar code.

Identification label dimensions:

- Height: 37 mm,
- Length: 70 mm.

2.3 Modem Labels

Two labels are attached to the underside of the modem:

- A production label provides the following information:
  - CE mark,
  - Crossed wheelie-bin mark (DEEE standard),
  - DC supply (VDC),
  - Hardware WatchDog mark (WD),
  - The IMEI 15-digit bar code.

- Additional marking: ROHS (2002/95/CE) and "E" (E24 10R-020250).

3 General Presentation

3.1 Physical Description

Description of the GenPro 2xe modem:

Connector
Micro-Fit 4-pins/M

Connector
Micro-Fit 2-pins/M
(only on
GenPro 24e)

Front side

Connector Sub HD
15-pins/F

Rear side

Connector SMA/F
(GSM antenna)

GSM LED   SIM card cover
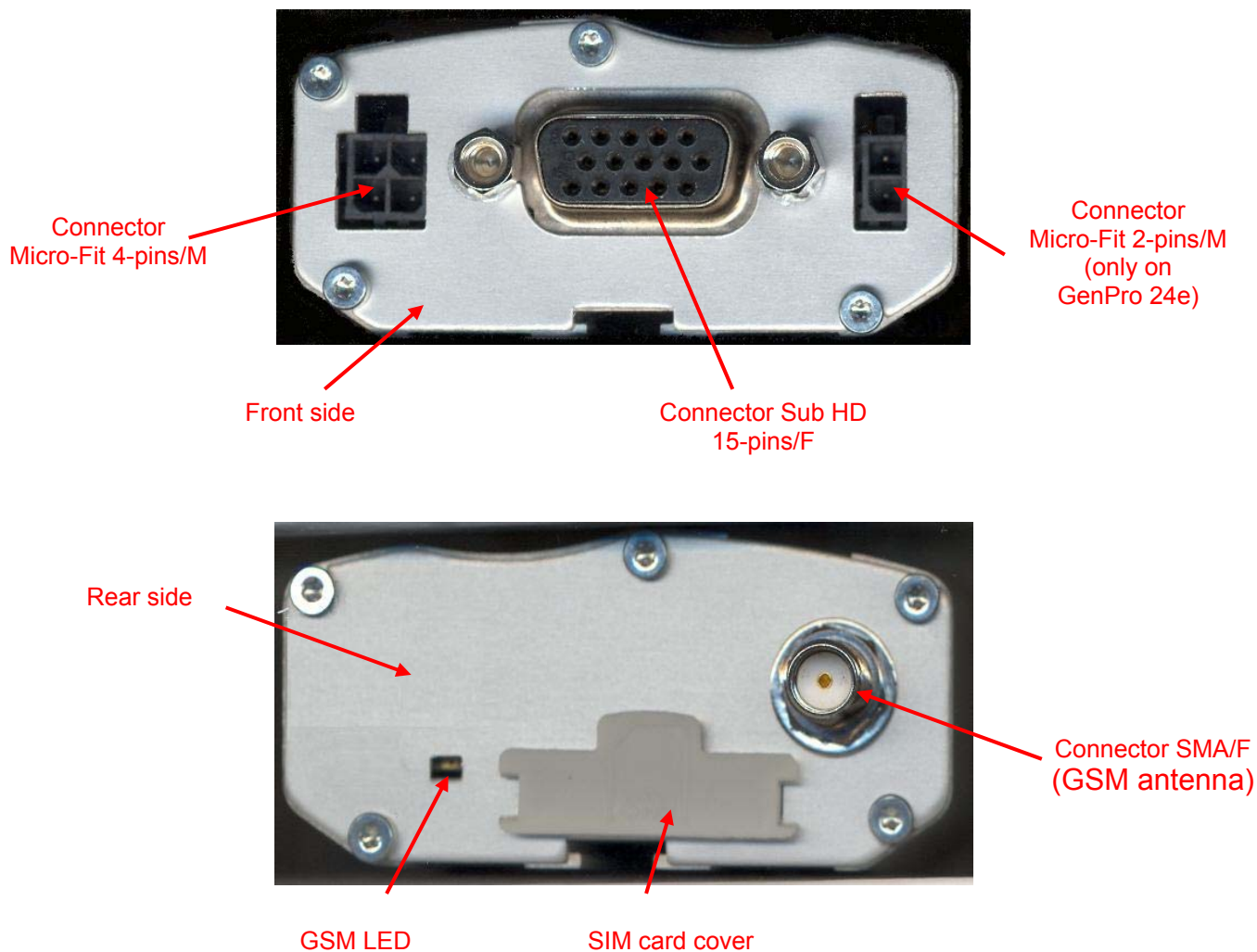
Two fixing brackets for attaching the modem to a support:

Fixing brackets

3.2 External connections

3.2.1 Connections

3.2.1.1 GSM antenna connector

The GSM antenna connector is a 50Ω impedance female SMA type.

3.2.1.2 Micro FIT connectors

4-pin Micro FIT female connector:

This connector allows the connection of an external DC supply, and provides one general-purpose input and one general-purpose output.
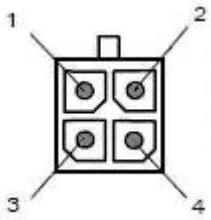
Pin N°	Signal
1	+VDC
2	GND
3	INPUT 1 (E1)
4	OUTPUT (S1)

WARNING : The pins 3 and 4 are used for the Input/Output functions.
The modem can only be power supplied by the pins 1 (+VDC) and 2 (GND).

2-Pin Micro FIT female connector:

This connector provides 2 general-purpose inputs.
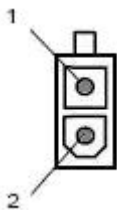
Pin N°	Signal
1	INPUT 3 (E3)
2	INPUT 2 (E2)

WARNING: These two pins are used by the GPIO in the case of the GenPro 24e modems.

3.2.1.3 15-pin Sub HD female connector

This connector provides:

- The serial RS232 link,

- The audio line connection (microphone and loud-speaker),

- The BOOT and RESET signals.
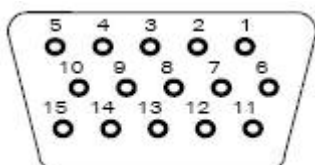
Pin N°	Description	Circuit (V24 – RS232C)	I/O
1	Signal detection / Buzzer	109 – DS – DCD	O
2	Data transmission	103 – ED – TXD	I
3	Boot	BOOT	I
4	Microphone +	MIC2P	I
5	Microphone -	MIC2N	I
6	Data reception	104 – RD – RXD	O
7	Data Set Ready	107 – PDP – DSR	O
8	Data Terminal Ready	108/2 – TDP – DTR	I
9	Ground	102 – TS – GND	-
10	Loud Speaker +	SPK2P	O
11	Clear To Send	106 – PAE – CTS	O
12	Request To Send	105 – DPE – RTS	I
13	Ring Indicator / 3,8V	125 – IA – RI	O
14	Reset	RESET	I
15	Loud Speaker -	SPK2N	O

Note (optional):
- Pin 1 is the Buzzer output (connection of 109/DCD circuit by default).
- Pin 13 is a DC output (for powering typically a GenBlue 10e accessory) of 3,8V 100mA (connection of 125/RI by default).

3.2.2 Cables

Depending on the GenPro ordered, the different cables described below will be supplied (refer to the Product Differences table).

3.2.2.1 4-wire micro FIT supply cable

This cable provides power to the modem.
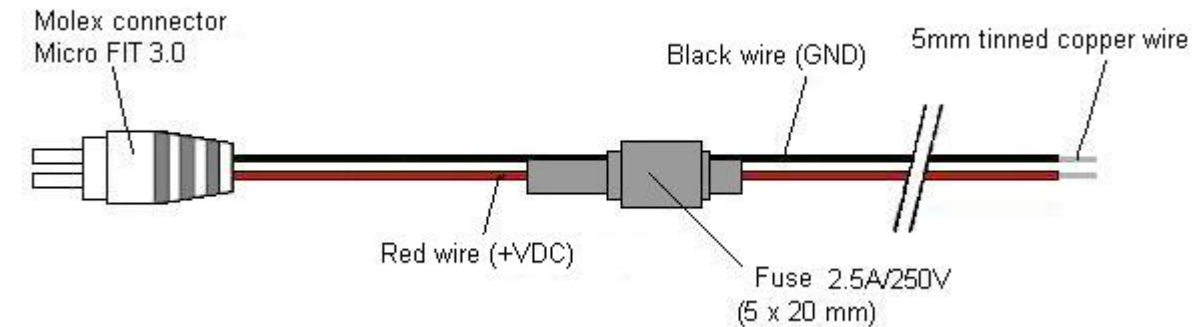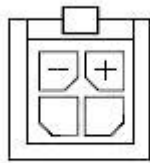
Component	Characteristics
4-pin Micro FIT connector	Type : MOLEX
Cable	Length ≈ 1.5m
Wire	Tinned copper 24 x 0.2 mm
	Surface area : 0.75 mm²

3.2.2.2 4-wire micro FIT supply and input/output cable

This cable provides power to the modem and access to one general-purpose input and one general-purpose output.
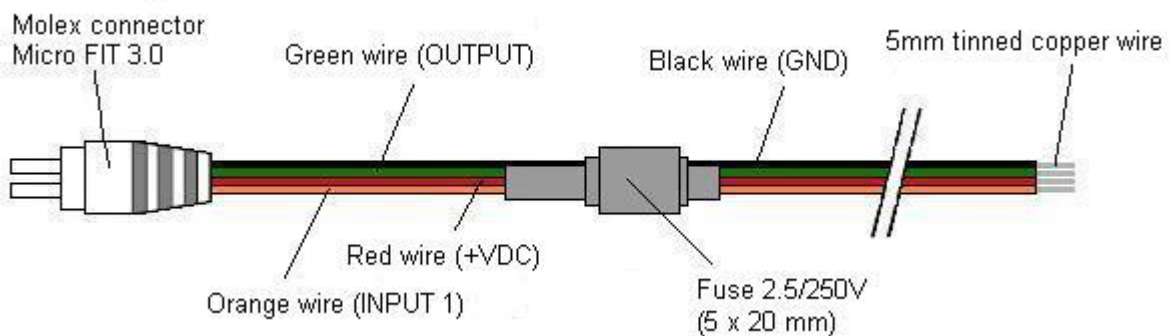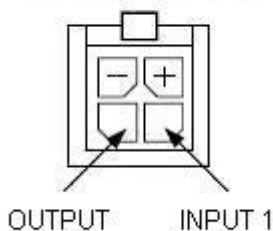
Component	Characteristics
4-pin Micro FIT connector	Type : MOLEX
Cable	Length ≈ 1.5m
Wire	Tinned copper 24 x 0.2 mm
	Surface area : 0.75 mm²

3.2.2.3 2-wire micro FIT inputs cable

This cable provides access to two general-purpose inputs.
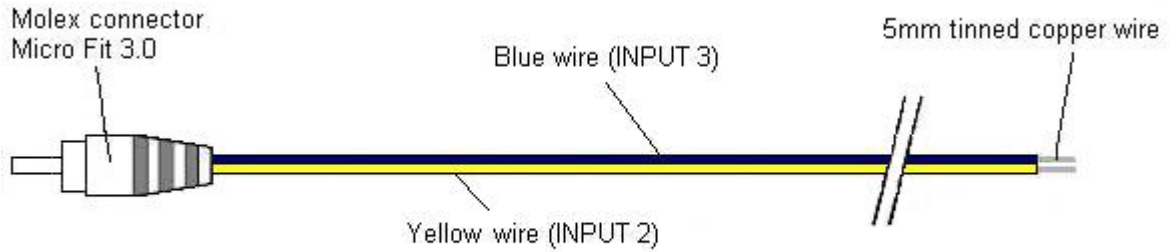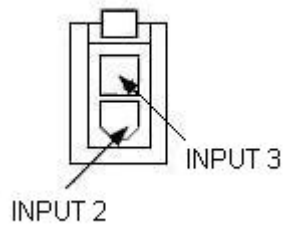
Component	Characteristics
2-pin Micro FIT connector	Type : MOLEX
Cable	Length ≈ 1.5m
Wire	Tinned copper 24 x 0.2 mm

4 Characteristics And Services

The GenPro is a class 10 GSM or GSM/GPRS modem intended for asynchronous binary data transmission, fax Group3 (Class 2), SMS and voice. It also has 3 general purpose inputs and 1 output.

The characteristics of the different GenPro are shown in the Product Differences table.

Options and accessories available for the modem GenPro modem are shown in the table below:

Available options / accessories	20e	24e
Options, please consult us		
- Flash memory extension	X	X
- Shock detector	X	X
- Buzzer output	X	X
- External remote supply for the GenBlue 10e	X	X
Accessories		
- Serial Data cable - 15M/9F or Data / Audio - 15M/9F/RJ9 cable	X	X
- Power supply 230 Vac - 12 Vdc	X	X
- GSM antenna (SMA-M)	X	X
- GenBlue 10e : Adaptor Bluetooth® / RS232 remote supply	X	X

5 Using The Modem

5.1 Starting with the modem

5.1.1 Mounting the modem

To mount the modem on a support, use the fixing brackets as shown in the diagram below:
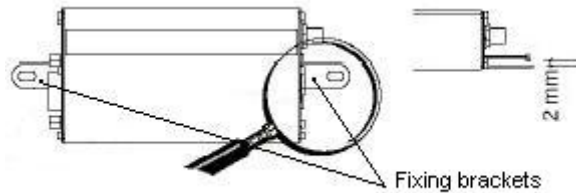
Note :
- Must be fixed to a flat surface.
- Maximum height of the screw head height: 2 mm

5.1.2 Installation of the modem

To install the modem, it is recommended to perform the following operations with the modem turned off:

- Remove the SIM card cover on the rear side.
- Carefully insert the SIM card into its holder.
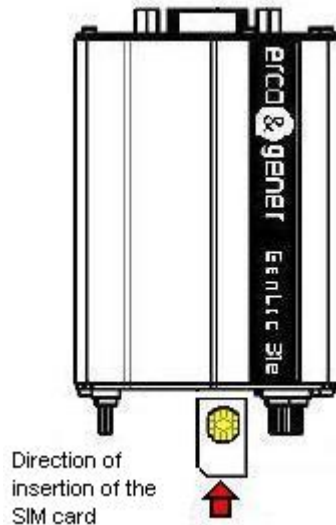
- Verify that the SIM card is positioned correctly.
- Connect the GSM antenna to the SMA connector.
- To connect to a DTE, connect the V24 link using the 15-pin Sub HD cable.
- Connect the supply cable to *an external regulated DC source (for automobile applications, refer to chapter **5.2 Recommendations for using the modem in vehicles**)*.
- Connect the supply cable to the modem and turn on the power supply. The GSM LED will light up.

The modem is now ready. Refer to chapter **5.8 Main AT commands (HAYES)** for a description of the commands for configuring and using the modem.

5.1.3 Communication with the modem

Connect the RS232 cable between the DTE (the COM port) and the modem (DCE).

Configure the DTE RS232 port as follows :

- Data rate : **9600 bps**,
- Data size : **8 bits**,
- Parity : **None**,
- Stop bits : **1**,
- Flow control : **hardware.**

Via the DTE (a PC running a communications application such as HyperTerminal), enter the command *AT(CR)*. The modem should reply with *OK*.

In the case where no communication can be established with the modem :

- Verify the RS232 connexion between the DTE and the modem (DCE),
- Verify the configuration of the COM port on the DTE.

Some examples of AT commands which can be sent to the modem once the communication has been established and verified (these commands are explained in detail later in the document) :

- *AT+CGSN* : the modem should reply with a 15 digit number (beginning with "35873000xxxxxxx").
- *AT+CPIN=xxxx* : enter the code of the SIM card xxxx (if active).
- *AT+CSQ* : verify the GSM signal reception level.
- *AT+CREG ?* : verify the registration of the modem on the network.
- *ATD<telephone number>* : start a voice call.
- *ATH* : hang-up (end of the call).

For further information about these AT commands and their associated parameters, refer to the "AT Commands Interface Guide" from WAVECOM and the "Commands List" from ERCO & GENER.

5.1.4 Re-initialisation of the modem

The hardware RESET signal is available on pin 14 of the 15-pin Sub HD connector. The modem is re-initialised when this RESET signal is held at a low level for at least 500µs.

> WARNING : This RESET signal should be considered as a means of re-initialising the modem in cases of emergency only. For further details concerning the RESET of the modem, see the chapter *7.6 RESET*.

5.2 Recommendations for using the modem in vehicles

> WARNING : The power supply connector on the GenPro must **NOT** be connected directly to the battery of a vehicle.

5.2.1 Recommended connection to the battery in a lorry

All lorries have a circuit breaker outside the cabin. The circuit breaker is necessary for security reasons. For example, if a fire breaks out in the lorry's electric box, the driver may cut the power source to avoid further danger and damage (explosion).

The circuit breaker is connected to the ground of the lorry, usually connected to the fuse box. As such, most lorry circuit breakers cut the ground connexion rather than the battery power side as shown in the diagram below :
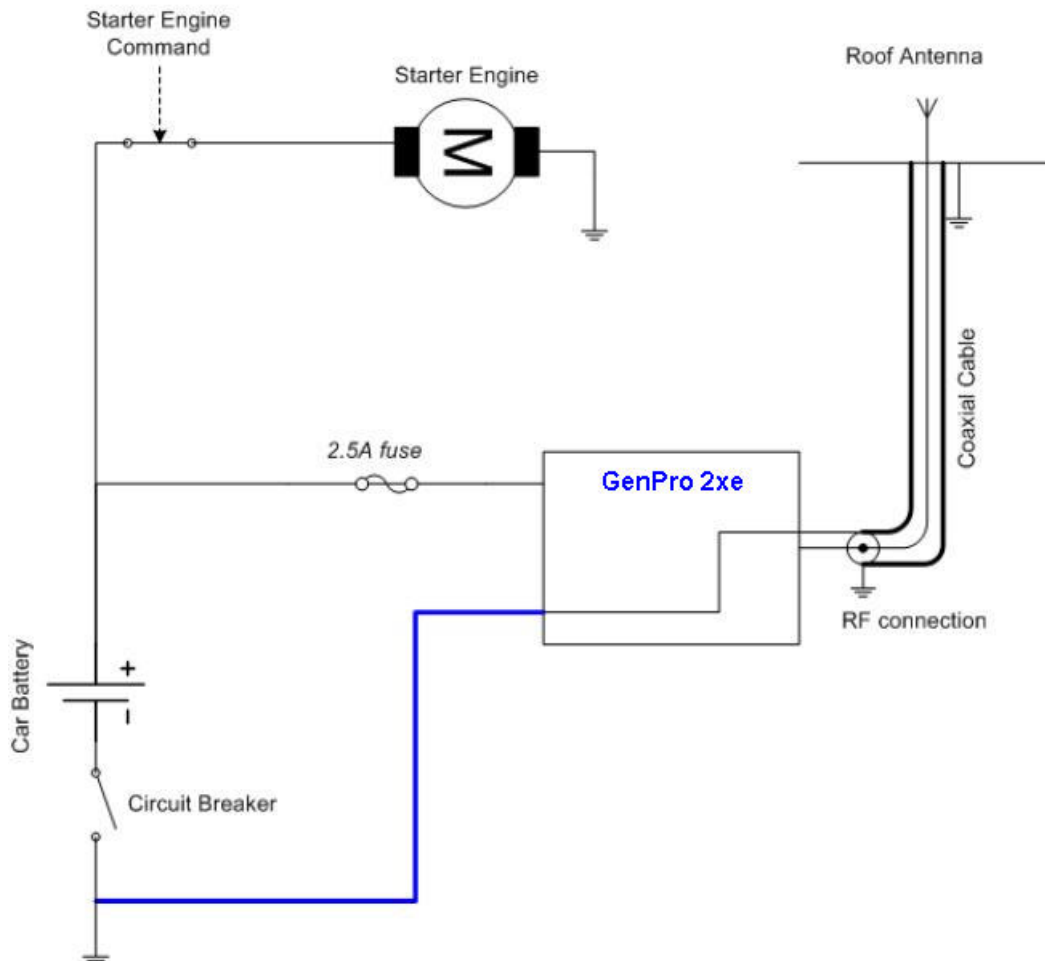
The diagram above shows a recommended connexion, where the modem is connected after the circuit breaker to the ground of the lorry (or in the fuse box) and **NOT** directly to the earth of the battery

5.2.2 Technical constraints in lorries

It is highly recommended to **NOT** connect the modem supply directly the battery but instead to the circuit breaker. Otherwise the modem may be damaged when the lorry is starting and the circuit breaker is closed. In this case the ground of the lorry and the ground of the battery will be connected together via the modem as shown in the diagram below:
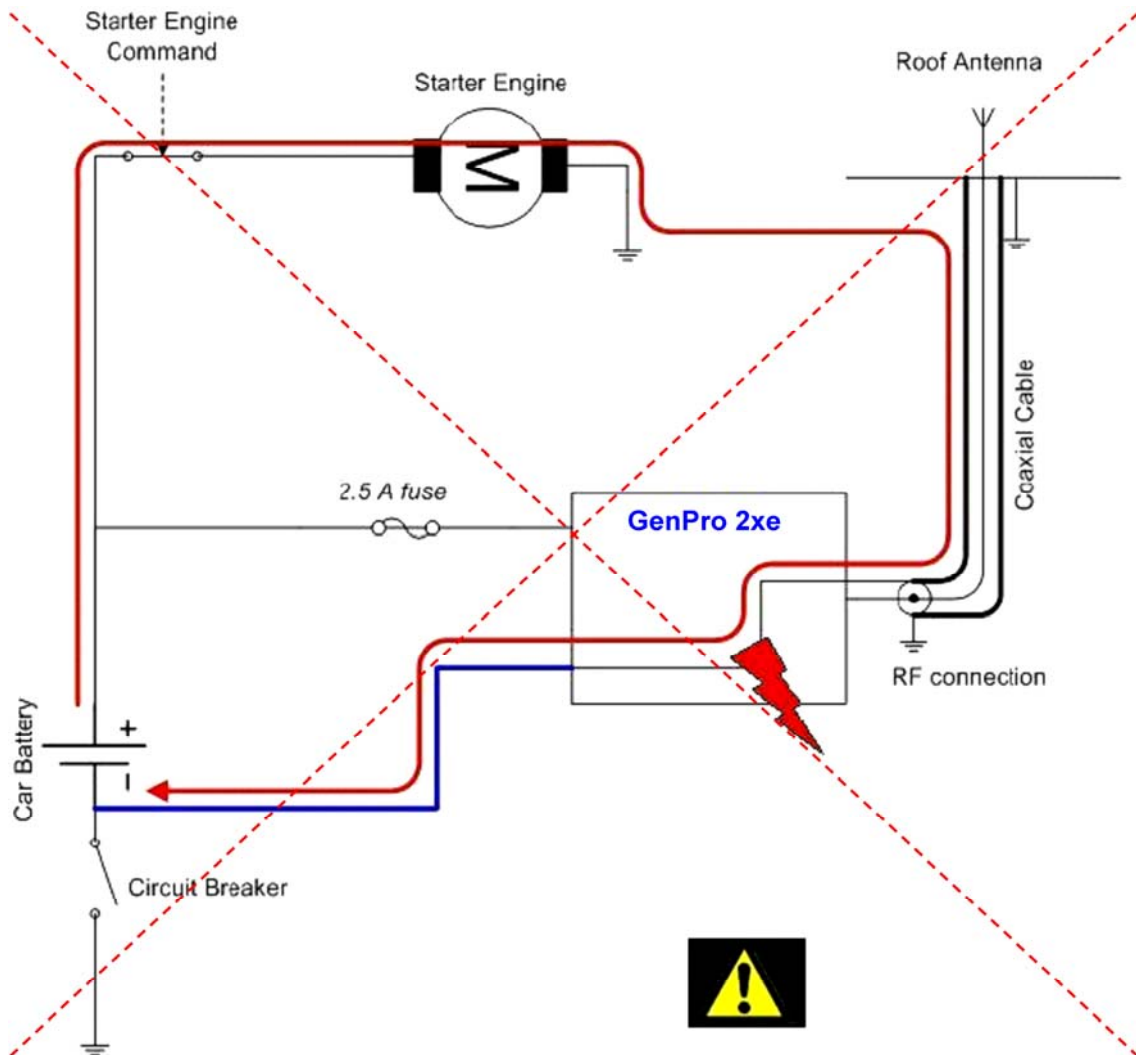
Example of a forbidden electrical connexion (risk of damage to the modem)

The diagram above shows an electrical connexion which may damage the modem because its ground is connected directly to the earth of the battery.

In this example, when the circuit breaker is closed, the current flows via the modem and the electrical circuits in the lorry (dash-board for example). When the lorry's starter motor is used it could result in the cables and or the modem being damaged or destroyed.

The internal circuits of the modem are not designed to withstand the high currents associated with starter motors.

5.3 GSM indicator LED

The state of the modem is indicated by the GSM LED located on the rear side of the modem (see chapter *3.1 Physical Description*). The table below shows the meaning of the different states of the GSM LED :

GSM LED	LED activity	Modem state
ON	LED on fixed	The modem is powered, it is ready to function but not yet recognised by the network; the PIN code has not yet been entered or the antenna is not connected.
	LED flashing (once every 2 seconds)	The modem is powered, the PIN code is active, the modem is recognised by the network and is ready to make or receive a call (Idle mode).
	LED flashing (Once a second)	The modem is powered and currently in communication (Voice, Data or Fax).
OFF	LED off	The modem is not powered or is in the RESET phase.

5.4 AT commands Echo deactivated

If no echo is returned when entering an AT command, it could be that :

- the "Local echo" of your communication application is not activated,

- and/or the modem's echo function has been deactivated.

The echo is configured by the command *ATE* and requires a back-up with the command *AT&W*.

To activate the modem echo, enter the command *ATE1*.

When using a communication application to send AT commands to the modem, it is recommended to :

- deactivate the "local echo" in your communication application,

- activate the modem echo (enter the command *ATE1*).

For a communication Machine to Machine with the modem, it is recommended to deactivate the modem echo (enter the command *ATE0*) to avoid the CPU receiving redundant responses.

For more information about the *ATE* command see the Wavecom "AT Commands Interface Guide".

5.5 Verifying GSM receive signal quality

The modem will be able to establish a call only if the received GSM signal is of a sufficient level.

The command **AT+CSQ** will return the reception level (*rssi*) of the signal sent by the closest GSM Base Transceiver Station (**BTS**), as well the receive bit error rate (*ber*).

When the SIM card is present and the PIN code has been entered, the command **AT+CSQ** will return the signal level from the BTS on the subscribed operator network.

When used without the SIM card, this command will simply indicate the closest BTS due to the fact that the modem cannot identify the current subscription. It is therefore advisable to make this test with the SIM card present.

To verify the GSM signal quality, perform the following operations :

> Using a communication application, enter the command **AT+CSQ**.
>
> The response is in the following format :
>
> **+CSQ: <rssi>,<ber>**   where : **<rssi>** = indicates the reception level,
>
>   **<ber>** = receive bit error rate.

> Verify the value **<rssi>** with the aid of the table below :

<rssi> value	Gain (dbm)	Interpretation	**<ber>** value	Interpretation
0	-113 dbm	Insufficient	0 to 7	See standard ETSI GSM 05.08
1 to 10	-111 to -95 dbm	Insufficient		
11 to 30	-93 to -53 dbm	Sufficient		
31 (max)	-51dbm	Perfect		
99		Unknown/not detectable	99	Unknown/not detectable

The GSM modem will function correctly with a minimum **<rssi>** of between 11 and 15.

Below 10 the signal is insufficient, the modem cannot function depending on the geographical situation or the mobility of the vehicle. Above 15 the signal is of a sufficient level.

For more information about the AT commands see the Wavecom "AT Commands Interface Guide".

A free Windows software tool, **GSM_Display**, available from our web site in **Support > Download > Tools** will graphically display the information concerning the GSM connexion between the GenPro and the BTS's (Base Transceiver Stations). It provides information about the operators, signal strengths and quality, etc.

5.6 Verifying the PIN code

The PIN code is essential in order to make a call or to accept a call from the GSM network.

The PIN code is held on the SIM card and can be modified by the user.

To verify a previously entered PIN code, use a communication application and enter the command *AT+CPIN?*

The table below shows the main responses from the modem :

Command	Response	Interpretation
AT+CPIN?	*+CPIN: ERROR*	The SIM card is absent or unknown
	+CPIN: READY	The PIN code is correct
	+CPIN: SIM PIN	The PIN code is bad or not yet entered
	+CPIN: SIM PUK	The PUK code is required

For more information about the AT commands see the Wavecom "AT Commands Interface Guide".

5.7 Verifying modem registration on the GSM network

1. Ensure that a valid SIM card is present in the SIM card reader in the modem.

2. Using a communications application, enter the following AT commands :

   a. *AT+CPIN=xxxx* Enter the PIN code. The user has only 3 attempts to enter the PIN code. After the third attempt, only the PUK code (supplied by the operator) will allow a new PIN code to be entered.

   b. *AT+CREG?* Verify the network registration status. The response will be of the following format : *+CREG: <mode>,<stat>* where :

      <Mode> = un-solicited registration message configuration,

      <Stat> = registration status

3. Verify the registration status with the aid of the following table :

Command	Response	Interpretation
AT+CREG?	*+CREG: 0,0*	The modem is not recognised by the network.
	+CREG: 0,2	The modem is searching for a network operator.
	+CREG: 0,1	The modem is GSM attached to a local operator.
	+CREG: 0,5	The modem is GSM attached to an operator in roaming mode.

If the modem is not registered, verify the antenna connexion and the receive signal level (see chapter **5.5 Verifying GSM receive signal quality**).

For more information about the AT commands see the Wavecom "AT Commands Interface Guide".

5.8 Main AT commands (HAYES)

The table below shows at a quick glance the main AT commands useful for the control of the modem.

For further information concerning the complete command set see the Wavecom "AT Commands Interface Guide" and the ERCO&GENER "Commands List".

Table : Main AT commands used with the modem.

Description	AT Command	Response	Interpretation
Enter the PIN code	AT+CPIN=xxxx (xxxx = PIN code)	*OK*	PIN code accepted
		+CME ERROR: 16	PIN code incorrect (1*)
		+CME ERROR: 3	PIN code already entered (1*)
Verification of GSM network registration	AT+CREG?	*+CREG: 0,0*	The modem is not recognised by the network.
		+CREG: 0,2	The modem is searching for a network operator.
		+CREG: 0,1	The modem is GSM attached to a local operator.
		+CREG: 0,5	The modem is GSM attached to an operator in roaming mode.
Reception of an incoming call (2*)	ATA	*OK*	Reply to the call
Make a voice call	ATD<telephone number>; (IMPORTANT: the ; at the end of the sequence specifies a voice call)	*OK*	Communication established
		+CME ERROR: 11	PIN code not entered
		+CME ERROR: 3	The credit has run out or the communication has already been established.
Make an emergency call (112)	ATD112;	*OK*	Communication established
Lost communication		*NO CARRIER*	
Hang-up	ATH	*OK*	

(1*) The command *AT+CMEE=1* allows the display of extended error codes. This command may be saved with the command *AT&W*.

The command *AT+WIND=63* allows the display of the change of status of the SIM card (present, ready…) and to check divers modem states (modem ready after RESET…). This command may be saved with the command *AT&W*.

(2*) The command *AT+CRC=1* will in the case of an incoming call, display more detailed ring information indicating the type of call - voice, data or fax. This command may be saved with the command *AT&W*.

Examples :

For VOICE :+CRING: VOICE

For DATA : +CRING: REL ASYNC

For FAX : +CRING: FAX

5.9 Powering down the unit

It is strongly unadvised to cut off the supply of GenPro whilst in communication or dialogue without having first detached from the network operator.

To avoid network congestion when powering down the modem, it is essential to first execute the command **AT+CPOF**. If this is not done, then, in certain cases the modem can remain registered on the network.

Before cutting the power in dialog mode (no communication), send the following command to the modem :

AT+CPOF or **AT+CFUN=0** (identical functioning). The modem will return OK and is no longer registered on the network. The radio module is put into standby and the power may then be removed.

Note : There is no particular action to be made to the GPS module before removing the power.

5.10 Updating the modem software

So as to be able to benefit from the latest functions of the GenPro, a procedure is used which will upgrade the software in the modem.

This consists of downloading the software into the internal Flash memory via the RS232 serial link available on the 15-pin Sub HD connector.

Please refer to the software update procedure document for a detailed description of this procedure.

WARNING: During the Firmware (OS) update or the Open AT application loading, YOU MUST TO REMOVE THE MODEM CARD SIM in order to deactivate the Material Watch Dog and so to avoid any blocking risks of the device.

6 Trouble Shooting

This section describes various problems and their solutions that may be encountered when using the modem.

Please consult the review on other problems in the FAQ's on our web site in **Support > FAQ**.

6.1 RS232 (V24) Communication problem

If the modem does not respond to any of the AT commands via the RS232 then refer to the table below for a list of possible causes and solutions.

Table : possible causes and solutions for RS232 communication problems

If the modem...	Check	Action
Returns nothing	Is the modem correctly powered?	Ensure that the modem is connected to an external regulated power source (5.5V to 32V DC). See chapter **8.2.1 Power supply**.
	Is the serial cable connected at both ends (PC and Modem)?	Verify the connexion of the serial cable.
	Is the serial cable correctly cabled according to the table in chapter **3.2.1.3 15-pin Sub HD female connector**?	Cable the serial cable according to the table in chapter **3.2.1.3 15-pin Sub HD female connector**.
Returns nothing or random characters	Is the communications terminal correctly configured on the PC?	Ensure that the terminal configuration corresponds to that of the modem. Factory configuration : Speed = 9600 bps Data bits = 8 Parity = none Stop bits = 1 Flow control = hardware
	Is there another application using the same port thus creating a conflict?	Close the conflicting application.
	Is the modem echo deactivated and without message reporting?	Enter the command **ATE1Q0** followed by **AT&W** if a backup is required.

6.2 "ERROR" message

The modem returns the message "**ERROR**" (in response to an AT command) in the following cases :

- The COM port is not directed to the GenPro but to another modem. Enter the command **ATI**. The response should be **WAVECOM MODEM**.... All other responses indicate a dialog with another modem. Verify the COM port used in the communications application.
- The syntax of the AT command is incorrect. Re-enter the command. (Refer to the Wavecom "AT Commands Interface Guide" and ERCO & GENER "Commands List".)
- The syntax of the AT command is correct, but with incorrect parameters :

- Enter the command *AT+CMEE=1* to obtain an error message with its error code instead of a simple "ERROR" message,
- Enter again the AT command which previously caused a problem to obtain the error code. In the case of an error, the response is in the form :

  +CME ERROR : <error code>, or

  +CMS ERROR : <error code>.

For further information about the error codes returned by the command *AT+CMEE*, refer to the Wavecom "AT Commands Interface Guide".

Note : It is strongly recommended to systematically allow the modem to return error codes (enter the command *AT+CMEE=1*).

6.3 "NO CARRIER" message

If the modem returns the message "NO CARRIER" after an attempted call (voice or data), check the table below for a list of possible causes and solutions.

Table : Causes and solutions when the "NO CARRIER " message is returned

Modem returns...	Check	Action
"NO CARRIER"	Is the received GSM signal strong enough?	Verify the received signal quality (see chapter *5.5 Verifying GSM receive signal quality*).
	Is the modem registered on the network?	Verify network registration (see chapter *5.7 Verifying modem registration on the GSM network*).
	Is the antenna correctly connected?	Check the GSM antenna installation (see chapter *8.2.6.3 External GSM Antenna* for installation recommendations).
"NO CARRIER" (when attempting a VOICE call)	Has the semi-colon (**;**) been entered immediately after the telephone number in the AT command?	Ensure that the semi-colon (**;**) been entered immediately after the telephone number in the AT command, for example : ATD0123456789**;**
"NO CARRIER" (when attempting a DATA call)	Has the SIM card been configured for data / fax calls?	Ensure that the SIM card is allowed to make data / fax calls (check with your SIM card supplier).
	Is the selected modulation type supported by the called number?	Ensure that the selected modulation type is supported by the called number.
	Is the selected modulation type supported by the network?	Ensure that the selected modulation type is supported by the network. If not, select a compatible modulation type with the command *AT+CBST=0,0,1* (1*).

(1*) For further information concerning this command see the ERCO&GENER "Commands List".

If the modem returns the message "NO CARRIER", use the command *AT+CEER* to see the extended error code. Refer to the table below for a list of extended error codes and their meanings.

Table : Interpretation of extended error codes

Error code	Meaning	Observations
1	Unassigned (unallocated) number	
16	Normal call clearing	
17	User busy	
18	No user responding	
19	User alerting, no answer	
21	Call rejected	
22	Number changed	
31	Normal, unspecified	
50	Requested facility not subscribed	Check your subscription (data subscription available?).
68	ACM equal to or greater than ACMmax	No more SIM card credit or card expired.
252	Call barring on outgoing calls	
253	Call barring on incoming calls	
3, 6, 8, 29, 34, 38, 41, 42, 43, 44, 47, 49, 57, 58, 63, 65, 69, 70, 79, 254	Network cause	See the Wavecom "AT Commands Interface Guide" or check with the operator.

Note : For other codes and information, see the Wavecom "AT Commands Interface Guide.

7 Functional Description

7.1 Architecture
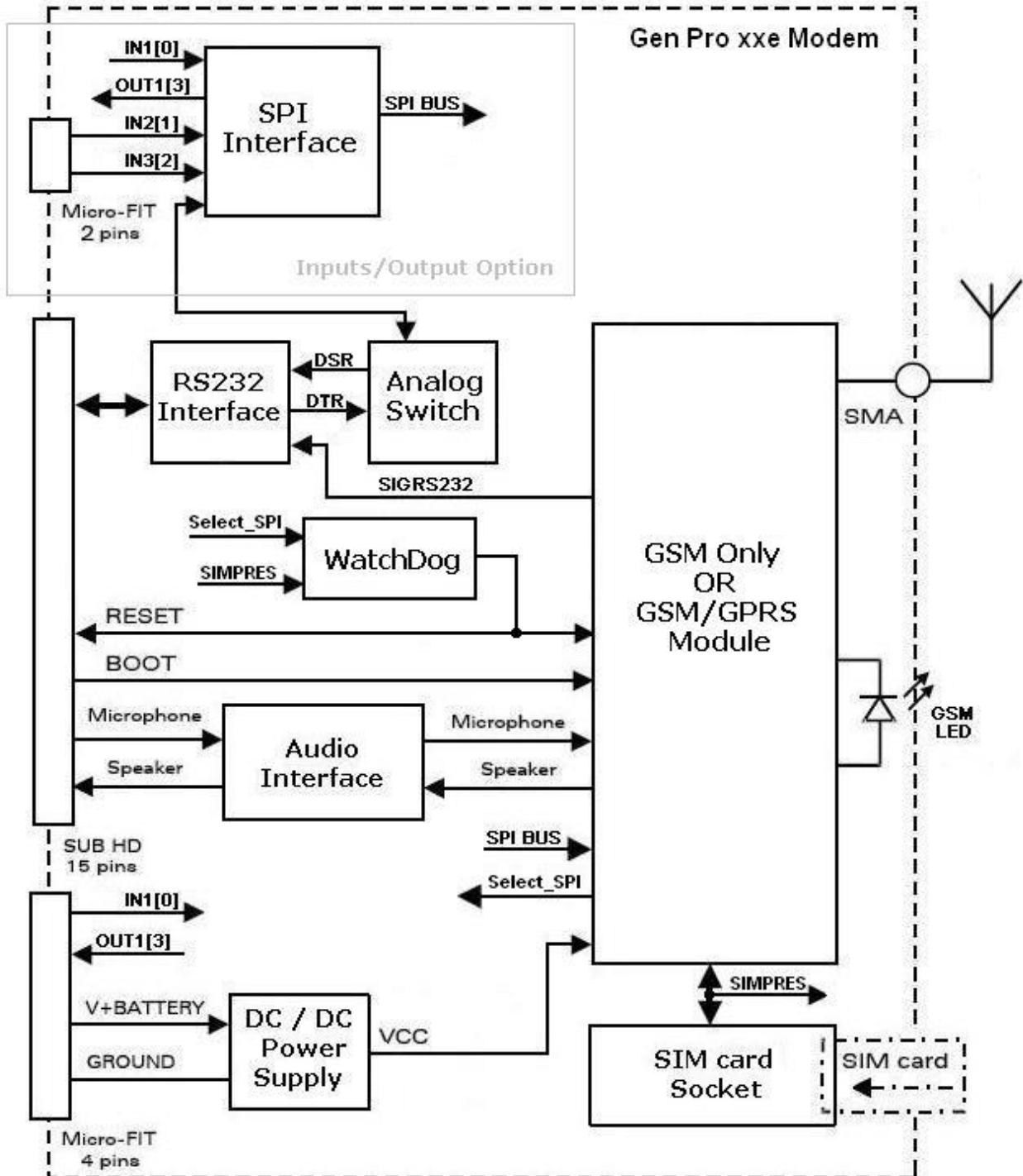
7.2 Power supply

7.2.1 General

The modem must be powered (V+BATTERY) by an external regulated DC power source of between 5.5V and 32V.

The modem's various internal DC voltages are provided by an internal DC/DC converter.

The correct functioning of the modem cannot be guaranteed if the input voltage (V+BATTERY) falls below 5.5V.

7.2.2 Protection

The modem is protected by an in-line 2.5A / 250V fuse in the power supply cable supplied with the modem.

It also has internal protection against power supply spikes of more than 32V.

Filter guarantees :

Input/output EMI/RFI protection,

Signal smoothing.

7.3 RS232 serial link

7.3.1 General

The RS232 interface provides a level translation between the WISMO (DCE) and the PC COM port (DTE).

The RS232 interface is protected internally (ESD protection) against external electrostatic spikes.

Filter guarantees :

Input/output EMI/RFI protection,

Signal smoothing.

The following signals are available :

TX data (CT103/TX)

RX data (CT104/RX)

Request To Send (CT105/RTS)

Clear To Send (CT106/CTS)

Data Terminal Ready (CT108-2/DTR)

Data Set Ready (CT107/DSR)

Data Carrier Detect (CT109/DCD) : optional Buzzer output,

Ring Indicator (CT125/RI) / 3.8V : optional 3.8V supply for GenBlue 10e.
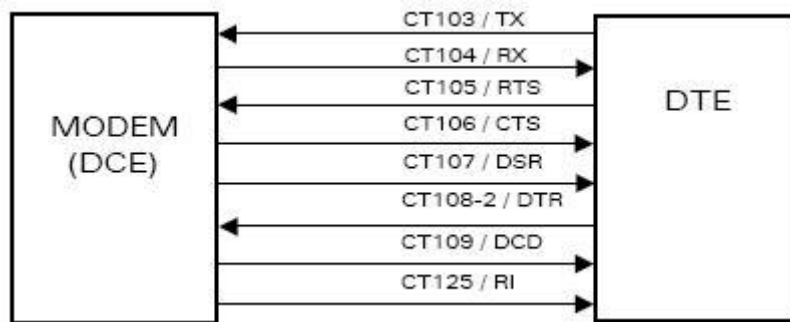
RS232 signals

The RS232 interface allows a certain amount of flexibility in the use of its signals. For example, the modem may operate in the 3-wire mode using only the TX, RX and GND signals. However, the CTS and RTS signals will also be required for GPRS applications and Xmodem upgrade.

7.3.2 Auto-baud mode

The auto-baud mode allows the modem to automatically detect the transmission speed used by the DTE. Only the following speeds will be detected : 2400, 4800, 9600, 19200, 38400, 57600 bps. Auto-baud detection cannot be guaranteed for speeds below or above these speeds.

The auto-baud mode is controlled by the AT commands. This function is explained in detail in the Wavecom "Commands Interface Guide".

Note : By default, the GenPro is delivered with the RS232 interface configured to 9600 bps, no parity, 8 data bits, 1 stop bit.

7.3.3 Pins description

Table : Pins description

Signal	Pin number on Sub HD connector	I/O	RS232 standard	Description	Alternative Function
CTXD/CT103	2	I	TX	Transmit serial data	
CRXD/CT104	16	O	RX	Receive serial data	
CRTS/CT105	12	I	RTS	Request To Send	
CCTS/CT106	11	O	CTS	Clear To Send	
CDSR/CT107	7	O	DSR	Data Set Ready	
CDTR/CT108-2	8	I	DTR	Data Terminal Ready	
CDCD/CT109	1	O	DCD	Data Carrier Detect	Buzzer output (1*)
CRI/CT125	13	O	RI	Ring Indicator	3.8V DC output (1*)
CT102/GND	9			Ground	

(1*) Optional, please consult us.

7.4 General Purpose Inputs / Output

Only the Gen Pro 24e modems is equipped with 3 opto-coupled inputs and 1 open-collector output for external use (please consult us).

The modem GenPro 20e is not equipped with GPIO's see Product Differences table).

The shock detector is pre-assembled option which must be requested when ordering.

Note : See chapter **8.2.4 General purpose inputs / output** for complete characteristics of the inputs/output.

7.5 BOOT

This signal must **not** be connected. Its use is strictly reserved by the manufacturer.

7.6 RESET

7.6.1 General

A low level input on this pin allows a forced emergency hardware RESET of the modem (see the chapter **7.6.2 RESET sequence** below). In this case it acts as an input. It must be driven by an open-collector or open-drain output circuit.

- pin 14 (RESET) at 0, to reset the modem,
- pin 14 (RESET) at 1, normal operating mode.

This pin may also be used to provide a RESET to an external equipment. In this case it acts as an output. If an external RESET is not required it may be left unconnected.

Table : Pin description

Signal	Pin number on Sub HD Connector	I/O	Type	Description
RESET	14	I/O	SCHMITT	Reset Modem

WARNING : This signal must only be used in a case of emergency. A software RESET is always preferable to a hardware RESET. It is strongly unadvised to execute a RESET whilst in communication or dialogue without having first detached from the network operator

Note : For more information about the software RESET, see the Wavecom "AT Commands Interface Guide". See chapter **5.9 Powering down the unit** to detach from the network and power down.

7.6.2 RESET sequence

To activate the emergency RESET sequence, the RESET signal may be pulled to a low level for at least 500µs.

After the modem has been RESET, if a SIM card is present in the reader there will be a delay whilst it is initialised before being accessible.

7.7 WatchDog

The Hardware WatchDog function allows the surveillance of the modem software activity: the Software management of the WatchDog must be implanted in the embedded application (Open AT).

If the software activity is interrupted, the component WatchDog starts a material Reset.

The WatchDog function is active only if the SIM card is present. That's why during a Firmware Update, it's imperative to remove the SIM card.

Note: On the box label, the presence of the WD mark allows to identify Modems GenPro integrating this hardware feature.

7.8 Audio

The audio interface is a standard interface for connecting a telephone handset.

Echo cancellation and noise reduction features are also available to improve the audio quality in hands-free applications.

ERCO & GENER recommend the use of the following cable : DATA/AUDIO Sub D 9pts Fem / Sub HD 15pts Male / RJ9 (order code 4404000205) and a telephone handset (order code 3153400000).

Table : Pin identification

Pin name	SUBD 9 F pin number	SUBD 15 M-HD pin number
DCD/Buzzer	1	1
RXD	2	6
TXD	3	2
DTR	4	8
GND	5	9
DSR	6	7
RTS	7	12
CTS	8	11
RI/3.8V	9	13
	RJ9 pin number	
Micro +	1	4
Speaker +	2	10
Speaker -	3	15
Micro -	4	5

7.8.1 Microphone

Differential microphone inputs are used to help reduce common–mode and TDMA noise. They are ESD protected.

An electret type microphone (0.5 mA / 2 Volts) may be connected directly to these inputs allowing the connexion of a telephone handset.

The microphone impedance is approximately 2 kΩ.

The gain of the microphone input may be internally adjusted in 3dB steps to between +30dB to +51dB by using the command *AT+VGT* (see the Wavecom "AT Commands Interface Guide").

Table : Pins description

Signal name	Pin number Sub HD Connector	I/O	Type	Description
CMIC2P	4	I	Analogue	Microphone +ve
CMIC2N	5	I	Analogue	Microphone -ve

7.8.2 Loud-speaker

Differential outputs are used to help reduce common–mode and TDMA noise.

The internal push-pull amplifier will drive load of between 32 and 105 Ohms and 1nF (see details in the table Speaker gain verses Max output voltage in the Wavecom "AT Commands Interface Guide").

The loud-speaker may be connected directly to the output pins.

The amplifier gain may be adjusted from between –22dB to +6dB in 2bB steps using the command *AT+VGR* (see the Wavecom "AT Commands Interface Guide").

Table : Pins description

Signal name	Pin number Sub HD Connector	I/O	Type	Description
CSPK2P	10	O	Analogue	Loud-speaker +ve
CSPK2N	15	O	Analogue	Loud-speaker -ve

7.8.3 Buzzer output

As an option, the GenPro provides a buzzer output on pin 1 of the15-pin Sub-D connector (instead of the DCD signal). This output provides a frequency intended to drive a **Transducer**.

Table : Pins description

Signal	Pin number Sub HD Connector	I/O	Type	Description
Buzzer	1	O	Analogue	Buzzer output

AT+WTONE : This command allows a tone to be played on the speaker or the buzzer. The frequency, gain and duration of the tone may be specified:

Syntax: **AT+ WTONE =<mode>,<dest>,<freq>,<gain>,<duration>**

<mode>

     0 : stop the tone

     1 : generate a tone

<dest> : Select the output

     1 : Speaker (Loud-speaker)

     2 : Buzzer

<freq> : Frequency of the tone

     for the Speaker, the range is 300Hz to 3400Hz

     for the Buzzer, the range is de 1Hz to 50000Hz

<gain> : Gain of the tone (default value 9 corresponding to -15dB)

the range is from 0dB to 15dB

<gain>	Speaker (dB)	Buzzer (dB)	*<gain>*	Speaker (dB)	Buzzer (dB)
0	0	-0.25	8	-12	-12
1	-0.5	-0.5	9	-15	-15
2	-1	-1	10	-18	-18
3	-1.5	-1.5	11	-24	-24
4	-2	-2	12	-30	-30
5	-3	-3	13	-36	-40
6	-6	-6	14	-42	-infini
7	-9	-9	15	-infini	-infini

< duration > : duration of the tone (in 100ms steps)

     The range is from 0 to 50. When the value is 0 the duration is infinite. The tone can be

     stopped with the command **AT+WTONE=0**.

Examples :

Command	Response	Interpretation
AT+WTONE=1,1,440,0,30	*OK*	A tone is output to the speaker output for 3 seconds.
AT+WTONE=1,2,4000,5,0	*OK*	A tone is output to the buzzer output. To stop the tone, send the command **AT+WTONE=0**
AT+WTONE=0	*OK*	Stop the tone.

The optional buzzer output is not cabled in the modem. For more information refer to the Wavecom "AT Commands Interface Guide".

Note : Refer to the table in chapter **8.2.2 Audio interface** for the characteristics of the audio interface.

8 Technical Characteristics

8.1 Mechanical

Table : Mechanical characteristics

Dimensions	73 x 54.5 x 25.5 mm (excluding connectors)
Overall Dimensions	90 x 54.5 x 25.5 mm
Weight	≈ 95 grams (modem only) < 197 grams (modem + fixing brackets + cables)
Volume	101.5 cm³
Case	Extruded aluminium
Ingress Protection	IP31

The illustration below indicates the dimensions (in mm) of the modem showing the clearances necessary for installation.
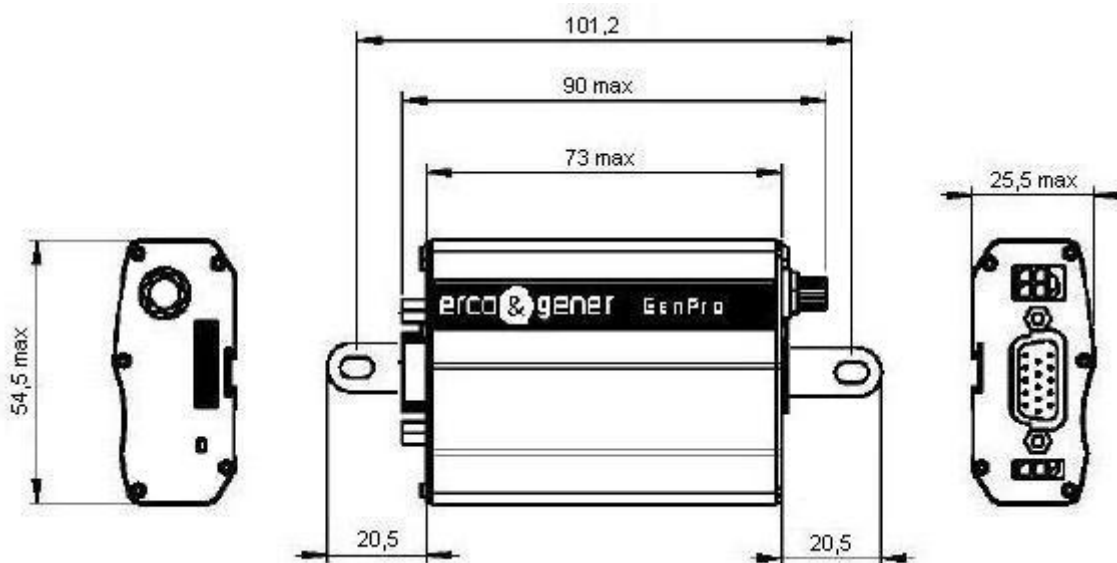
8.2 Electrical

8.2.1 Power supply

Table : Voltage range and power consumptions

Operating voltage range	5.5V to 32V DC (GSM or DCS or GPRS)
Average power consumptions	- GSM 900 MHz : 105mA @ 12V in communication - GSM 1800 MHz : 80mA @ 12V in communication

Note : The modem is permanently powered once the power supply is connected.

The table below indicates the consequences of over and under-voltage on the modem.

Table : Effects of a power supply defect

If the voltage :	Then :
falls bellow 5.5V	GSM and GPS communications cannot be guaranteed.
goes above 32V (transient peaks)	The modem guarantees its own protection.
goes above 32V (continuous over-voltage)	The modem is short-circuited by an internal varistor. The modem is then protected by the in-line fuse.

The table below indicates the power supply consumption of the modem without the RS232 connected.

Table : Consumption (1*) without RS232 connected

CONDITIONS T=25°C and 3V SIM card		E-GSM/GPRS 900MHz		E-GSM/GPRS 1800MHz	
		I Nom.(mA)	I Max.(mA)	I Nom.(mA)	I Max.(mA)
Idle mode (2*)	@ 5,5V	17,5	23	17,5	23
	@ 12V	11,7	16,5	11,7	16,5
	@ 32V	8,6	11,5	8,6	11,5
Idle mode 32K (3*)	@ 5,5V	12	14,5	12	14,5
	@ 12V	9,2	11,3	9,2	11,3
	@ 32V	7,7	9,7	7,7	9,7
In communication GSM 1RX/1TX Power (2W/1W)	@ 5,5V	182,5	195,5	135	145
	@ 12V	96	103,5	71,75	78
	@ 32V	40	44,5	31	34,75
In communication GPRS CL10 3RX/2TX Power (2W/1W)	@ 5,5V	320	341	230	242
	@ 12V	165	177	120	127,5
	@ 32V	67	72	50	53,5
During TX bursts Power (2W/1W)	@ 5,5V	1178	1400	670	780
	@ 12V	600	712	342	400
	@ 32V	230	274	132	156

(1*) The power consumption may vary by 5% over the whole operating temperature range (-20 °C to +55 °C)
(2*) Idle mode : modem is registered on the network but not in communication.
(3*) Idle mode 32K : low power mode controlled by an external application, via the DTR CTS signals.

8.2.2 Audio interface

The audio interface is accessible via the 15-pin Sub HD connector (see chapter *7.7 Audio*).

8.2.2.1 Microphone and Loud-speaker

Table : Characteristics of the audio interface on the 15-pin Sub HD connector

Audio parameters	Min.	Typ.	Max.	Units	Comments
Microphone input current @ 2V / 2 KΩ		0.5		mA	
Absolute microphone input voltage (max.)			100	mV pp	AC voltage
Loud-speaker output current (load 150 Ω // 1nF)		16		mA	
Absolute loud-speaker impedance	32	50		Ω	
Impedance of the loud-speaker amplifier in differential mode			1	Ω	+/- 10%

Table : Characteristics of the internal microphone input filter

Frequency range	Gain
0 - 150 Hz	< -22 dB
150 - 180 Hz	< -11 dB
180 - 200 Hz	< -3 dB
200 - 3700 Hz	0 dB
> 4000 Hz	< -60 dB

Table : Recommended microphone and loud-speaker characteristics:

| Microphone characteristics	Value
Type	Electret 2 V / 0.5 mA
Impedance	Z = 2 kΩ
Sensitivity	-40 dB to -50 dB
SNR	> 50 dB
Frequency response	Compatible with the GSM specifications
Loud-speaker characteristics	Value
Type	10mW, electromagnetic
Impedance	Z = 32 to 50 Ω
Sensitivity	110 dB SPL min. (0 dB = 20 µPa)
Frequency response	Compatible with the GSM specifications

8.2.2.2 Buzzer option

Audio parameters	Max.	Units
Loud Speaker output current (max.)	80	mA
Command voltage VCE	32	V

Table: Example of a transducer tested with the GenPro :

Buzzer characteristics	Values
Type	Transducer KINGSTATE KX-1612
Power consumption	6-18V peak/40mA max.
Resonant frequency	2400Hz ±200HZ
Coil impedance	115.0 Ω ±17.2 Ω
Acoustic level	Min.85dBA (Typical 92) @10cm

The internal output circuit of the Wismo is an open-drain:
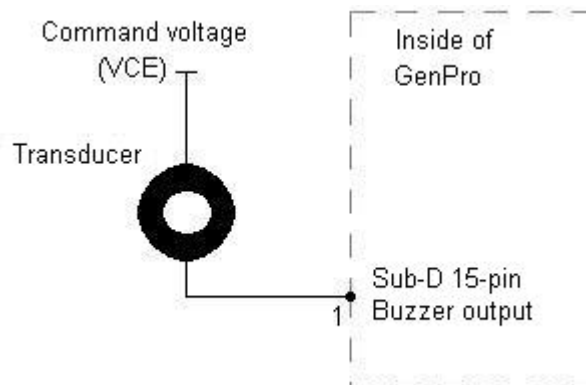
8.2.3 SIM Interface

Table : SIM card characteristics

SIM Card	3 V or 1.8 V

8.2.4 General purpose inputs / output

The GenPro 24e modem provide 3 opto-coupled inputs (E1, E2 and E3) and 1 open-collector output (S1).

8.2.4.1 Inputs

Table : Characteristics of the opto-coupled inputs

Parameter	Minimum value	Maximum value
Control voltage	5.5 V DC	32 V DC
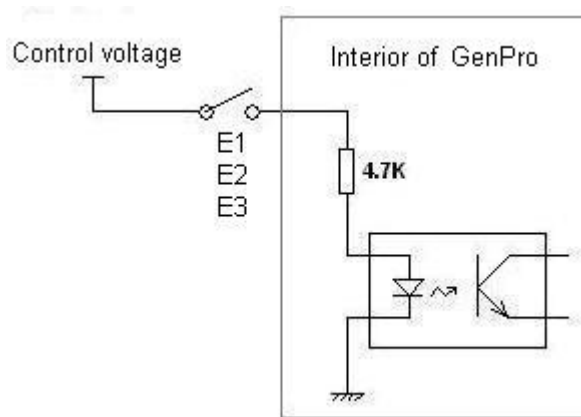
Typical input circuit of the three inputs

8.2.4.2 Output

Table : Characteristics of the open-collector output

Parameter	Maximum value
Collector voltage	60 V DC
Collector current	1 A DC

Typical output circuit of the output

8.2.5 RESET Signal

Table : RESET signal electrical characteristics
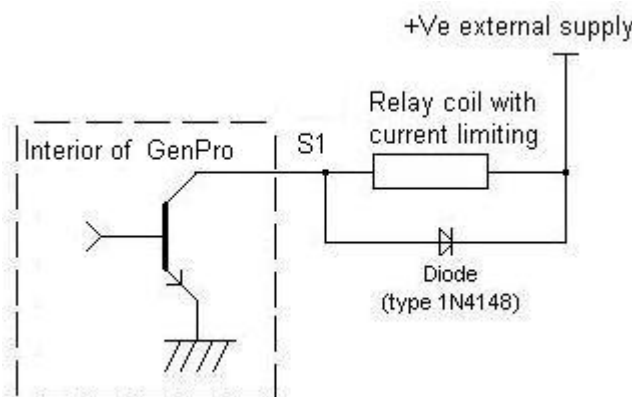
Parameter	Minimum value	Maximum value	Unit
Input impedance (R)	4.7		kΩ
Input capacitance (C)		10	nF
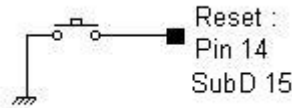
Typical RESET connection

Table : RESET signal operating conditions

Parameters	Min.	Max.	Condition
*V_{T-}	1.1 V	1.2 V	
*V_{T+}	1.7 V	1.9 V	
V_{OL}	0	0.4 V	I_{OL} = -50 µA
V_{OH}	2.0 V	2.8 V	I_{OH} = 50 µA

* V_{T-}, V_{T-} Hysteresis thresholds

8.2.6 GSM/DCS

8.2.6.1 Frequency bands

Table : Frequency ranges

Parameter	E-GSM 900	DCS 1800
Transmission frequency	880 to 915 MHz	1710 to 1785 MHz
Reception frequency	925 to 960 MHz	1805 to 1880 MHz

8.2.6.2 RF Performances

The RF performances are compliant with the ETSI GSM 05.05 recommendation.

The RF performances for receiver and transmitter are given in the table below.

Table : Receiver and Transmitter RF performances

Receiver	
E-GSM900 Reference Sensitivity	E-GSM900 Reference Sensitivity
GSM/DCS1800 Reference Sensitivity	GSM/DCS1800 Reference Sensitivity
Selectivity @ 200 kHz	Selectivity @ 200 kHz
Selectivity @ 400 kHz	Selectivity @ 400 kHz
Linear dynamic range	Linear dynamic range
Co-channel rejection	Co-channel rejection
Transmitter	
Maximum output power (E-GSM 900) at ambient temperature	Maximum output power (E-GSM 900) at ambient temperature
Maximum output power (E-/DCS 1800 at ambient temperature	Maximum output power (E-/DCS 1800 at ambient temperature
Minimum output power (E-GSM 900) at ambient temperature	Minimum output power (E-GSM 900) at ambient temperature
Minimum output power (E-DCS 1800) at ambient temperature	Minimum output power (E-DCS 1800) at ambient temperature

8.2.6.3 External GSM Antenna

The external GSM antenna is connected to the modem via the SMA/M connector. It must have the characteristics listed in the table below.

Table : External GSM antenna characteristics

Antenna frequency range	Dual-band GSM 900 / DCS 1800 MHz
Impedance	50 Ohms nominal
DC Impedance	0 Ohm
Gain (antenna + cable)	0 dBi (in a minimum direction)
VSWR (Rx max TX max)	1.5:1
Polarisation	Linear

Note : See chapter *10 Recommended Accessories* for GSM antenna recommended by ERCO & GENER.

8.3 Environmental characteristics

To ensure the correct operation of the modem, the limits listed in the table below should be respected.

Table : Environmental characteristics

Operating temperature	-20 °C to +55 °C
Storage temperature	-30 °C to +85 °C
Operating humidity without condensation	HR < 70% @ +55°C
Atmospheric pressure	normal

8.4 Standards / Conformities

The product conforms to the following requirements :

- R&TTE 1999/5/EC Directive,
- Regulations of standard ETSI EN 301 489-7 (02),
- 95/54/EC Automotive Directive: E24 10R-02050 ("E" mark),
- 2002/96/CE DEEE (crossed out wheelie bin).

It also conforms to the following standards:

Standard	Reference
Safety Standard	EN 60950 (ed. 2000 3rd Edition)
EMC - Conducted disturbance measurement	EN 55022 : 1994
EMC - Electrostatic discharges immunity	EN 61000-4-2 : 1995
EMC - Radiated radio frequency disturbances immunity	EN 61000-4-3 : 1996
EMC - Fast transient burst immunity	EN 61000-4-4 : 1995
EMC - Conducted radio frequency disturbances immunity	EN 61000-4-6 : 1996
Road vehicles (Automotive)	ISO 7637-1 Ed.1990

The following mark is visible on the underside of the unit :

$$C \in$$

The GenPro modem conforms to the 2002/95/CE – ROHS requirements.

8.5 Protections

8.5.1 Power supply

The modem is protected by an in-line fuse in the power supply cable supplied with the modem.

The fuse type is : FSD 2.5 A / 250 V FAST.

8.5.2 Over-voltage

The modem is protected against voltages over +32 VDC.

When the supply voltage exceeds +32 VDC, the power supply is cut in order to protect the internal electronic components against the over-voltage.

8.5.3 ESD

The modem will withstand ESD's on all accessible parts of the modem (except for the RF part) according to the IEC 1000-4-2 requirements:

8 kV air discharge,

4 kV contact discharge.

8.5.4 Miscellaneous

Filter guarantees :

Input/output EMI/RFI protection,

Signal smoothing.

9 Security Recommendations

9.1 General

It is important to follow the specific regulations for the use of radio operator equipment, in particular the possible risks of radio frequency interference (RFI). Please follow carefully the security advice given below.

Turn off your GSM modem :
- On an aircraft. The use of cellular telephones can endanger the operations of the plane, disturb the cellular network and is illegal. The non-observance of this instruction can lead to the suspension of cellular telephone services as well as a fine.
- At a refuelling station.
- In any area with a potentially explosive atmosphere which could lead to an explosion or a fire.
- In hospitals and similar places where medical equipment may be in use.

Restrictions of use of radio operator equipment in :
- Fuel depots.
- Chemical factories.
- Locations where demolition is under way.
- Other places where signs indicate that the use of cellular telephones is prohibited or dangerous.
- Other places where you should normally turn off the engine of your vehicle.

There can be a danger associated with the use of your GSM modem close to insufficiently protected medical devices such as acoustic apparatus and pacemakers. Consult the manufacturers of medical equipment to determine if it is adequately protected.

The use of your GSM modem close to other electronic equipment may also cause interference if the equipment is insufficiently protected. Observe all the manufacturer's warnings and recommendations for the equipment.

The modem is designed to be used with "fixed" and "mobile" applications :
- "Fixed application" : The GSM modem is physically connected to a site and it is not possible to be easily moved to another site.
- "Mobile application" : The GSM modem is designed to be used in various places (other than fixed) and is intended for use in portable applications.

9.2 Security in a vehicle

Do not use your GSM modem whilst driving a vehicle, unless equipped with a correctly installed ear-piece/hands-free kit.

Respect the national regulations for the use of cellular telephones in vehicles. Road safety is always a priority.

An incorrect installation of a GSM modem in a vehicle could cause incorrect operation of the electronics of the vehicle. To avoid such problems, ensure that the installation is carried out by a qualified person. At the time of the installation, verify the electronic protection system of the vehicle.

The use of an apparatus to activate the headlights or the horn of a vehicle on a public highway is not authorized.

9.3 Care and maintenance

The suggestions below will help you to look after and preserve this product for many years.

- Do not expose the modem to the extreme environments such as a high temperature or a high humidity content.
- Do not use or store the modem in dusty or dirty places.
- Do not open or disassemble the modem. ALL WARRANTIES ARE VOID IF THE PRODUCT IS OPENED, ALTERED, AND/OR DAMAGED.
- Do not expose the modem to liquids. It is not impermeable.
- Avoid dropping, striking, or shaking the modem violently.
- Do not place the modem near computer disks, credit or voyage cards or other magnetic media. The information contained on the discs or the cards can be affected by the modem.
- The use of third party equipment or accessories, not made or authorized by ERCO & GENER can cancel the guarantee.

9.4 Your responsibility

This modem is under your responsibility. Treat it with care. It is not a toy. Install it in a secure place out of the reach of children.

Make a careful note of your PIN and PUK codes. Familiarize yourself with the modem and its functions. Use the security functions to prevent unauthorized use and/or theft.

10 Recommended Accessories

The accessories recommended by ERCO & GENER for use with the GenPro modem are shown on our Internet site in the section *Products > Accessories*. For more information, contact our sales department.

11 Client support

ERCO & GENER ensures customer support for all sold modems. As such you will have access to:

    The latest version of this document,

    The product's brief commercial description,

    The latest Wavecom OS User Guides,

    Conformity certificates,

    Application notes.

Note: The optional support for Open AT development is also available (please consult us).

DECLARATION OF CONFORMITY

<u>Manufacturer</u> : ERCO & GENER

<u>Address</u> :   Rue des Petites Granges
Z.I. de Saint Lambert des Levées
B.P. 30163
49412 SAUMUR CEDEX – France

<u>Website</u> :   http://www.ercogener.com

declares that the products :

<u>Name</u> :	GenPro 20e	<u>Type</u> :	Modem
<u>Name</u> :	GenPro 24e	<u>Type</u> :	Modem

<u>Complies with</u> :   - R&TTE 1999/5/EC Directive,

- Regulations of standard ETSI EN 301 489-7 (02),

- ROHS Compliant : Directive 2002/95/CE,

- 95/54/EC Automotive Directive : E24 10R-020250 ("E" Mark).

<u>Safety</u>   :   EN 60950 :   2000 3rd Edition

<u>EMC</u>   :   EN 55022 : 1994   Conducted disturbance measurement
EN 61000-4-2 : 1995   Electrostatic discharges immunity
EN 61000-4-3 : 1996   Radiated radio-frequency disturbances immunity
EN 61000-4-4 : 1995   Fast transient burst immunity
EN 61000-4-6 : 1996   Conducted radio-frequency disturbances immunity

ISO 7637-1 Ed. 1990   Road Vehicles

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The corresponding markings appear under the appliance.

Saumur, April 10th 2006

Charles CHAUSSONNIER
Managing Director